

## **WHAT IS CLAIMED IS:**

1. A telecommunication element having a color identifying coating thereon, the telecommunication element comprising:

5           an elongated communication transmission medium; and

          a coating having an identifying color applied on at least a portion of the transmission medium, wherein said coating comprises a radiation cured, crosslinked polymeric network, and wherein the identifying color in the coating is provided by at least one chromophore molecule covalently bonded by at least one covalent bond to said polymeric network.

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2. The telecommunications element of claim 1, wherein:

(i) the elongated transmission medium is an optical fiber having a core and a cladding surrounding the core;

(ii) the identifying color is thermally stable and light fast; and

15           (iii) the chromophore molecule is not an azo molecule.

3. The telecommunications element of claim 1, wherein the identifying color in the coating is provided by at least one anthraquinone moiety covalently bonded by at least one covalent bond to said polymeric network.

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4. A colored oligomer for providing color to a coating on a communications element, said colored oligomer comprising the reaction product of:

(a) an isocyanate end capped oligomer; and

25           (b) a radiation curable monomer having both (i) a reactive functionality which is reactive with isocyanate and (ii) ethylenic unsaturation,

          wherein said colored oligomer is end capped with radiation curable groups by covalent linkages formed by reacting said reactive functionality (i) of said radiation curable monomer (b) with an isocyanate moiety of said isocyanate end capped oligomer (a),

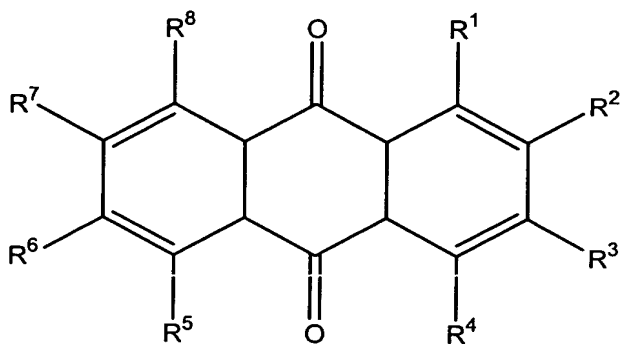
          and said isocyanate end capped oligomer (a) is the reaction product of:

30           (c) at least one polyfunctional compound having at least two isocyanate reactive groups; and

(d) at least one polyisocyanate,

said polyfunctional compound (c) comprising at least one dye having at least two isocyanate reactive functionalities.

- 5            5. The colored oligomer of claim 4, wherein said dye is an anthraquinone dye and said anthraquinone dye has the following formula:

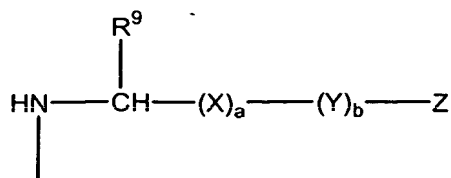


- 10            wherein R groups R<sup>1</sup>, R<sup>2</sup>, R<sup>3</sup>, R<sup>4</sup>, R<sup>5</sup>, R<sup>6</sup>, R<sup>7</sup> and R<sup>8</sup> are each independently selected from the group consisting of hydrogen, amino, hydroxy, halogen, nitro, carboxylated alkali metal, sulfated alkali metal and a hydrocarbyl group optionally containing one or more heteroatoms,

- provided that at least two of R groups R<sup>1</sup> through R<sup>8</sup> have at least one isocyanate  
15    reactive functionality selected from the group consisting of -OH, -NH<sub>2</sub> and -SH,  
              and further wherein adjacent R groups from among R<sup>1</sup> through R<sup>8</sup> can form a ring.

6. The colored oligomer of claim 5, wherein from 1 to 3 of said R groups R<sup>1</sup> through R<sup>8</sup> have the following formula:

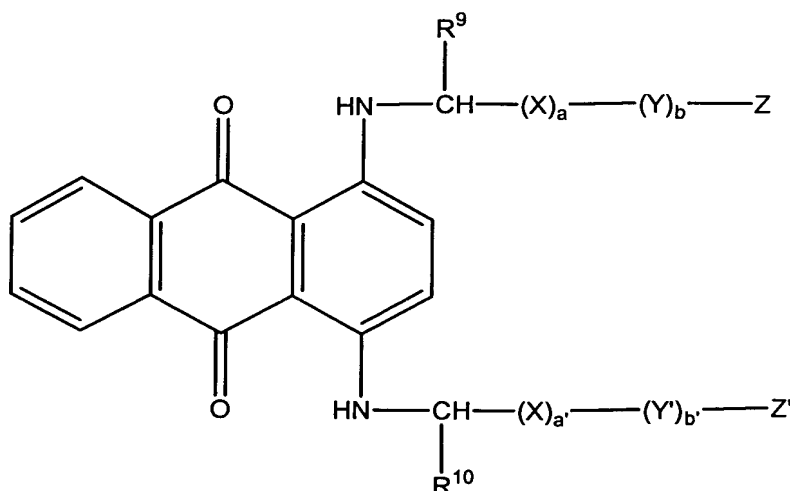
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wherein  $R^9$  is hydrogen or an alkyl group having from 1 to about 12 carbon atoms, X is  $-CH_2-$ , a is an integer from 1 to about 6, Y represents polymeric units of hydroxy alkenes or alkylene oxide monomers selected from the group consisting of ethylene oxide, propylene oxide, butylene oxide, cyclohexane oxide, and glycidol, b is either 0 or 1, and Z is a reactive  $-OH$ ,  $-NH_2$ , or  $-SH$  group, and

further wherein the remainder of said R groups  $R^1$  through  $R^8$  are selected from the group consisting of hydrogen, amino, hydroxy, halogen, nitro, carboxylated alkali metal and sulfated alkali metal.

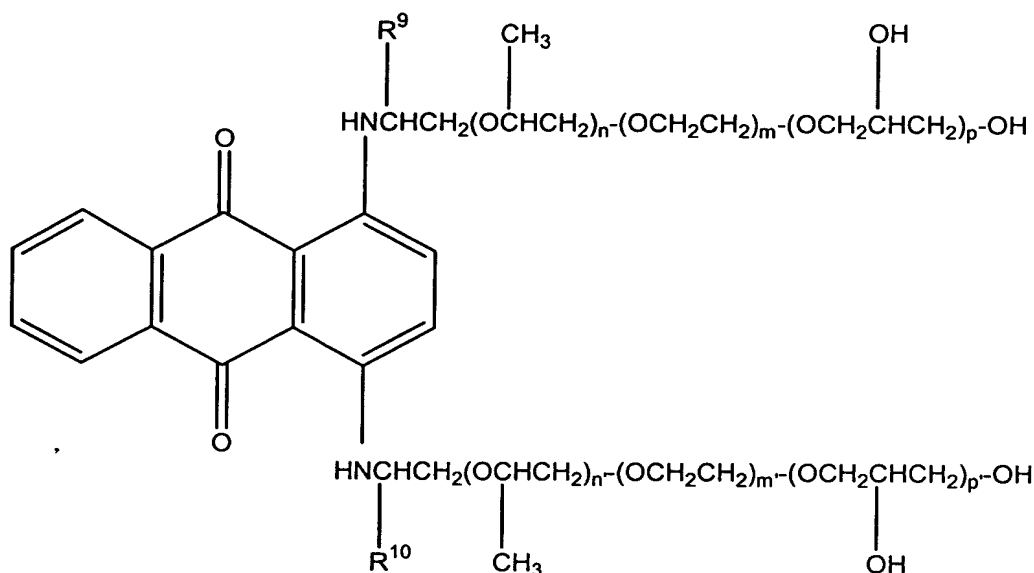
7. The colored oligomer of claim 5, wherein said anthraquinone dye has the following formula:



wherein  $R^9$  and  $R^{10}$  are independently selected from hydrogen or an alkyl group having from 1 to about 12 carbon atoms, X is  $-CH_2-$ , a and  $a'$  independently are integers from 1 to about 6, Y and  $Y'$  are independently represent polymeric units of hydroxy alkenes or alkylene oxide monomers selected from the group consisting of ethylene oxide, propylene oxide, butylene oxide, cyclohexane oxide, and glycidol, b and  $b'$  are independently either 0 or 1, and Z and  $Z'$  independently are reactive  $-OH$ ,  $-NH_2$ , or  $-SH$  groups.

8. The colored oligomer of claim 7, wherein said isocyanate end capped oligomer (a)

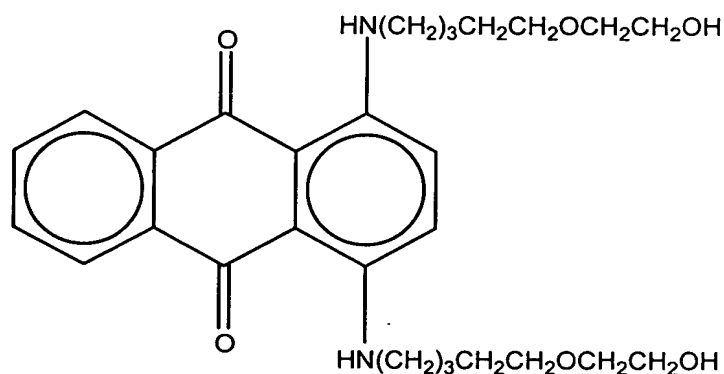
is a urethane oligomer and said anthraquinone dye has the following formula:



wherein n, n', m, m', p, and p' independently have a value of from 0 to about 40.

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9. The colored oligomer of claim 7, wherein said anthraquinone dye has the formula



10. The colored oligomer of claim 5, wherein said anthraquinone dye is selected from the group consisting of 1,5-bis((3-hydroxy-2,2-dimethylpropyl)amino)-9,10-anthracenedione; 2,2'-((9,10-dihydro-9,10-dioxo-1,5-anthracenediyl)bis(thio))bis-benzoic acid, 2-hydroxyethyl ester; and 1,5-bis((2,2-dimethyl-3-hydroxypropyl)amino)-4,8-bis((4-methylphenyl)thio) anthraquinone.

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11. The colored oligomer of claim 5, wherein said anthraquinone dye is 1,5-bis((2,2-dimethyl-3-hydroxypropyl)amino)-4,8-bis((4-methylphenyl)thio) anthraquinone.

12. The colored oligomer of claim 4, wherein a (meth)acrylic group represents the ethylenic unsaturation (ii) in the radiation curable monomer (b).

13. A photocurable resin composition for forming a colored, cured coating on an optical fiber, said resin composition comprising:

(e) at least one (meth)acrylate end capped urethane oligomer;

(f) at least one photoinitiator;

(g) at least one reactive diluent; and

(h) at least one colored oligomer according to claim 4.

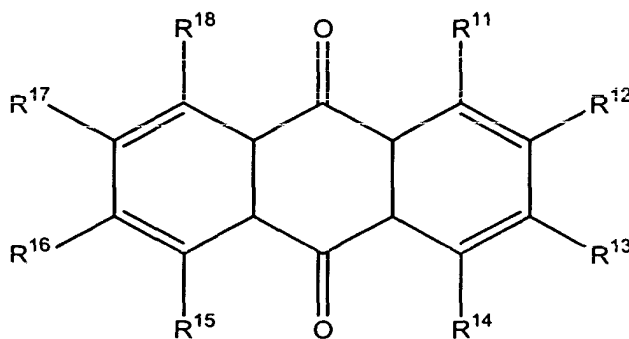
14. An optical fiber comprising a colored, cured coating, said colored, cured coating having been formed from the photocurable resin composition of claim 13.

15. A reactive anthraquinone dye for providing color to a coating on an optical fiber, said reactive anthraquinone dye comprising an anthraquinone core group with at least one substituent comprising a radiation curable group.

16. The reactive anthraquinone dye of claim 15, wherein said radiation curable group is an ethylenically unsaturated group or an epoxy group.

17. The reactive anthraquinone dye of claim 15, wherein said radiation curable group is a (meth)acrylic group.

18. The reactive anthraquinone dye of claim 15, wherein said reactive anthraquinone dye has the following formula:

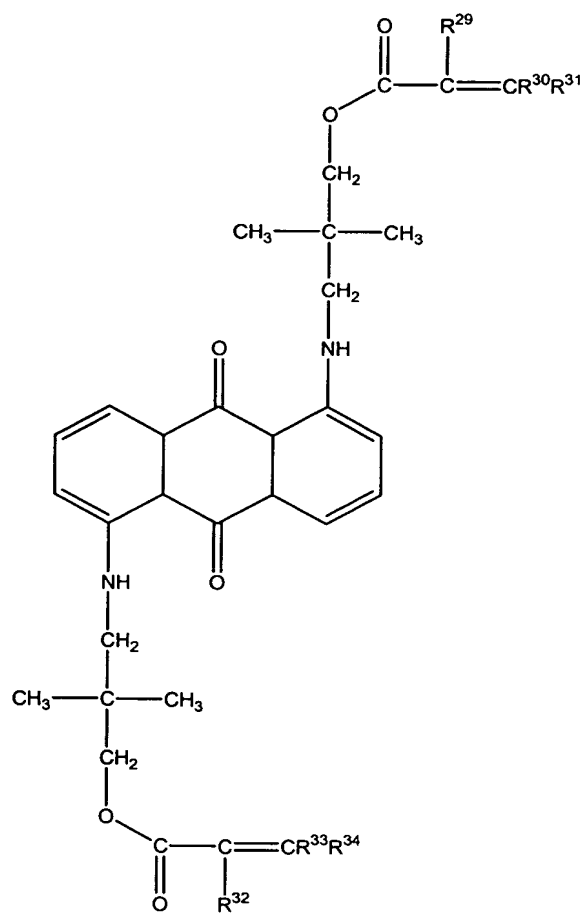


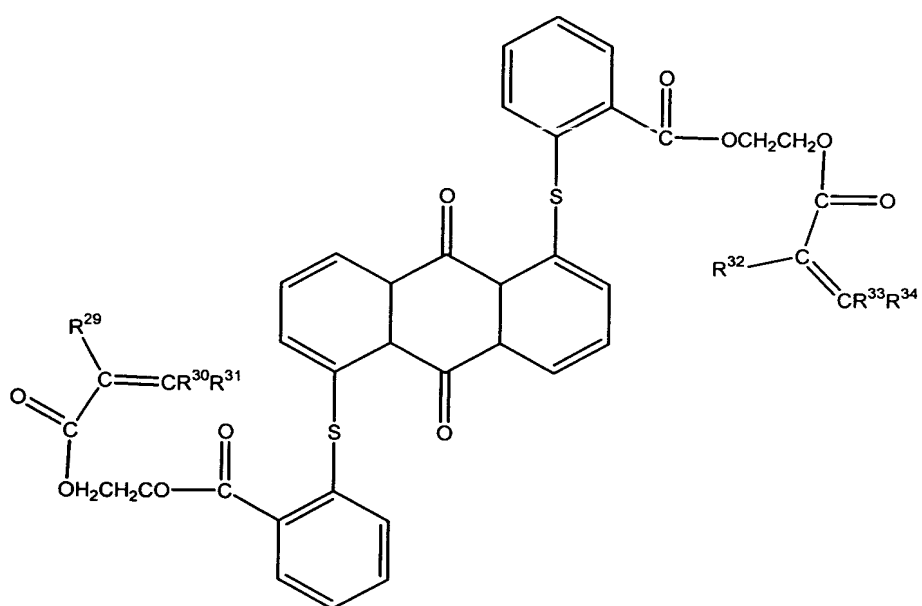
wherein R groups  $R^1$ ,  $R^2$ ,  $R^3$ ,  $R^4$ ,  $R^5$ ,  $R^6$ ,  $R^7$  and  $R^8$  are each independently selected from the group consisting of hydrogen, amino, hydroxy, halogen, nitro, carboxylated alkali metal, sulfated alkali metal and a hydrocarbyl group optionally containing one or more heteroatoms,

provided that at least one of R groups  $R^{11}$  through  $R^{18}$  have at least one ethylenically unsaturated radiation curable functionality.

19. The reactive anthraquinone dye of claim 18, wherein one or two of said R groups  $R^{11}$  through  $R^{18}$  have a (meth)acrylic functionality and at least four of said R groups  $R^{11}$  through  $R^{18}$  are hydrogen.

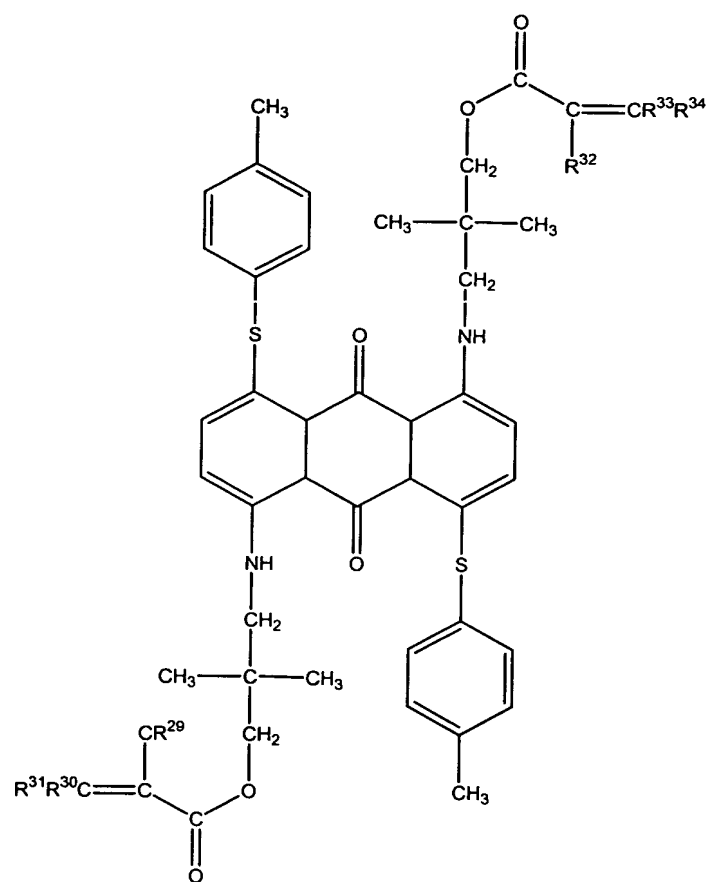
20. The reactive anthraquinone dye of claim 18, wherein the reactive anthraquinone dye has one of the following formulas:





, or





wherein R<sup>29</sup>, R<sup>30</sup>, R<sup>31</sup>, R<sup>32</sup>, R<sup>33</sup>, and R<sup>34</sup> are the same or different and are independently hydrogen or a C<sub>1</sub> to C<sub>6</sub> alkyl optionally substituted with one or more substituents selected from the group consisting of -OH, -NH<sub>2</sub>, -SH, -NO<sub>2</sub>, -CN and halogen.

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21. A photocurable resin composition for forming a colored, cured coating on an optical fiber, said resin composition comprising:

(a) at least one (meth)acrylate end capped urethane oligomer;

(b) at least one photoinitiator;

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(c) at least one reactive diluent; and

(d) at least one reactive anthraquinone dye according to claim 18.

22. An optical fiber comprising a colored, cured coating, said colored, cured coating having been formed from the photocurable resin composition of claim 21.